DATA PROCESSING DIGEST

A SERVICE OF CANNING SISSON AND ASSOCIATES

ME 2 NUMBER 2 | 914 SOUTH ROBERTSON BOULEVARD • LOS ANGELES 35, CALIFORNIA | FEBRUARY, 1956

Applications

"A big inventory problem and the IBM 702"

Neil Macdonald
COMPUTERS AND AUTOMATION, September 1955; pages 6-12.

IBM keeps its inventory on tape files

((The first part of this article describes the IBM 702.))

IBM is using its 702 for its own inventory problem at its Poughkeepsie plant. The inventory consists of about 40,000 fabricated, purchased parts and assemblies for 2400 major assemblies.

Inputs: Monthly, production schedule and engineering changes on cards; "where used" data on magnetic tape. Daily, "old" inventory balance on tape and 9000 transactions.

Each tape record has 511 characters showing parts used per machine, and including the effect of engineering changes for the next 12 months.

Materials Requirements Planning: This parts-usage record is updated (by engineering changes) and used for material requirements calculations. The schedule of machines to be built is processed against the parts-usage tape to get the total requirements for each part number. Material requisition cards are punched.

Inventory Control: Each record of the master balance forward tape contains 394 characters for each of 4000 parts, giving description, "indicative data," and current monthly and year-to-date quantities. Materials requirements for 12 months, and scrap data are available. The tape is updated by new requirements monthly. Then inventory calculations are made, plus "evaluating the inventory," and punching overage notices and requirements variance notices.

Daily, the balance forward tape is updated with transaction cards and a summary of transactions is printed.

Output: Monthly, updated "where-used" tape, new material requirements tape, overage notices and variance notices.

Daily, new inventory tape, order cards, expenditure cards, inventory summary register.

The method of determining economic order quantity is described ((it is the fairly standard square-root formula)).

"Automation in the office"

OFFICE MANAGEMENT, December 1955; page 36.

Nationwide Insurance

Nationwide Insurance of Columbus, Ohio, is installing IBM transceivers to be coupled with their IBM 650. This will enable them to transmit policy holder information from punched cards in their regional offices to punched cards in the Columbus office where the data is processed and returned to the regional offices in the same manner.

Three railroads using Reservisor

See DPD this issue, page 3 : "...Railroading schedules ahead for nationwide pulse-controlled traffic."

"The application of automatic computing equipment to savings bank operations"

R. Hunt Brown, Automation Consultants
COMPUTERS AND AUTOMATION, July 1955, pages 18-21.

Status of accounts automatically available to tellers

A system is proposed for a savings bank which answers the need for large memory with rapid random access, and which makes use of existing computing and data processing devices on the building block principle.

The system would work like this:

Each teller would have at his window a posting machine and an inquiry station connected with the large rapid-access magnetic-drum memory with computing facilities located in the main office. The inquiry station would consist of indicator buttons and lights which would give the teller the information he needed about an account after he has entered the account number and pressed the proper indicator buttons. A series of lights, for example, would show the present balance of any account; other lights would show any unusual conditions of the account, as needed.

An alphabetical file book containing signatures, account numbers, etc., would be at each teller's window. This would be updated by the method now used by phone companies for information directory service.

An advantage of this system is that the teller does not have to leave his window to get a ledger card; nor would tubs of ledger cards in fireproof files be needed. A visual record may be printed out by the computer chronologically, and serially by account number at the end of the day. The customer's routine would not be changed, and the entire operation would be speeded up. All branches could use the central computing equipment, with information available to each teller in less than one second.

"Charting on automatic data processing systems"

Harry Eisenpress, James L. McPherson, Julius Shiskin, Bureau of the Census
COMPUTERS AND AUTOMATION August 1955; pages 21-23, 27.

A method of charting time series on a high-speed printer activated by magnetic tape is described. An illustration accompanies the article, showing the chart with the points plotted by the printer, and the same chart with the points connected manually.

"...Railroading schedules ahead for nation-wide pulse-controlled traffic"

CONTROL ENGINEERING, December, 1955; pages 19, 20

With Santa Fe's acquisition of a Teleregister Reservisor system, it is now possible for railroad passengers to make complete cross-country reservations via Santa Fe, New York Central, and New Haven.

(See DPD, June 1955, page 7: "Electronic reservation system for New Haven.")

"Analog-to-digital conversion units"

Bernard S. Benson, Benson-Lehner Corp., Los Angeles

This clearly-written paper gives some vivid examples of the use of analog-to-digital converters, including the human being. For example, the problem of converting time worked into paycheck dollars. Some suggestions are given for studying the application of automatic analog-to-digital devices in a specific problem, and a list of manufacturers and a bibliography is included.

A copy of the paper may be obtained from the author.

Systems Design

"Business systems can be engineered"

Roger L. Sisson, Canning, Sisson and Associates, Los Angeles
AUTOMATION, December 1955; pages 54-61.

"Closed loop" concept is applied to business management

A way of "engineering" business systems is suggested, patterned after these steps generally followed in an engineering job:

1. Set specifications.

2. Choose components.

3. Test the proposed design.

4. Test by construction of a prototype.

5. Construct, install, test and put into operation.

First, management must determine what it requires of each of the four types of data processed in a business. These four are:

1. Reports required by accounting and legal authorities (payroll, tax reports, general ledgers, etc.)

2. Information needed by management to make intelligent decisions about running the business (cost reports, performance vs budget reports, production reports, etc.)

3. Data manipulation required in complex decision-making procedures (statistical market analysis, mathematical programming, etc.)

4. Orders to operating people (purchase orders, shop orders, bank drafts, invoices, etc.)

In determining what is needed from the above types of data processing, management must consider the future requirements in order that the system will not become obsolete too quickly. A careful study of management policy and existing procedures is made by business systems engineers.

After the set of requirements or specifications has been approved by management, the systems engineer enters the design stage.

Although "business system theory is in a state of growth...and there appears to be no tested set of theories to guide the systems designer....an analogous model that may serve to guide the thinking of those dealing with business systems is that of a closed-loop control system."

In addition to meeting legal and audit requirements, the major design problems then are: 1) How to transmit the input criteria to the controlling executive; 2) how to determine and provide the feedback data required by the executive; 3) how the executive should use the data to control the system (the decision-making process); 4) how to put these decisions into effect; 5) how to gather the feedback data; 6) what memory (file-system) is required; and 7) how the feedback data should be processed.

"Since the business is a multiloop system, these questions must be answered for each loop, taking into consideration the interrelationships of the loops."

The design process follows these steps:

1. Decide what files are required and what data must be collected from the operating levels in order to maintain the files and provide information for the required reports, etc.

2. The required data must be gathered.

3. Transmit the data to places where it will be utilized, using common language media as much as possible.

4. Files are maintained in either of two ways; *real-time* or *on-line; delayed, batched,* or *off-line.*

5. Data is processed either during time files are up-dated, or during a separate computing run. Since new management science techniques require more complicated computing procedures, equipment should be chosen with this trend in mind.

6. Data is printed out on appropriate printing equipment.

"Every company whether it has 50 employees or 20,000 has a data processing system of some sort. An engineering approach to the design of the system may result in significant savings for any company, even though the final system is just an improved manual system."

"File reference"

J. A. Postley, The RAND Corp., Santa Monica, Calif.
RAND Report #P-691

Pipeline time and traffic rate are factors in automatic filing

File reference problems are divided into two parts: 1. "The determination of the *location* of the desired information" which is "done by reference to an index of some kind" and 2. "efficiently programming the *movement* of the storage media with respect to the access station (s) so as to 'read' the information."

Two terms are defined: "average *pipeline* time may be defined as the aver-are time required between the presentation...of a request for reference to the file and the completion of the same reference....The *traffic rate* may be defined as the number of references in a unit time period for which system capability is provided." Other major factors are *file size* and *cost*.

Serial-access systems are characterized by long pipeline times, but high traffic rates, if requests are also serial.

In random-access systems the pipeline time is the reciprocal of the traffic rate.

A difficult problem in file reference occurs when one wishes to "process the low priority requests in a 'serial' manner, but...high priority requests 'randomly.'"

Pipeline time can be reduced in serial file systems by reducing the period during which data is "batched" with a resulting lower traffic rate.

The paper then goes on to describe a particular magnetic-tape system which allows reasonable psuedo-random operation. The arrangement of data in the files, indexing method, and equipment design problems are discussed. Programs for the search operation are given and also estimates of total tape search time.

Systems with 10 to 30 tape units can locate 2 to 3 items per second under typical conditions.

((The results of this paper are along the lines of those discussed in: "An Optimization Concept for Business Data Processing Equipment" by D. R. Swanson, Proceedings, Western Joint Computer Conference (IRE), 1955, pages 43-48. See DPD, October 1955, page 16))

Equipment

"The application of the Kodak Minicard System to problems of documentation"

A. W. Tyler, W. L. Myers, and J. W. Kuipers, Eastman Kodak Company

Paper presented at the Annual Meeting, American Documentation Institute, Cleveland, November 4, 5, 1954.

Visual and digital information on microfilm cards

The paper describes the Kodak Minicard which combines the merits of the microfilm and the punched card. Both digital information (in the form of small dots on the film) and photographic images may be carried on the Minicard, which is a piece of photographic film 16 mm by 32 mm. Up to 12 images may be carried on the card, plus coded digital information. If the card contains no graphic images, a maximum of seventy columns of 42 bits each, or a total of 2940 bits, may be carried. The cards are handled in groups of 2000 or less on metal sticks.

The digital information is in the form of dot patterns, entered in fields which serve certain functions. The first two columns are blank in the master card, and codes are added in the duplicating process, which are then used for sorting purposes. In the control field, codes are used to designate such items as file number and number of cards per group. The remainder of the space allotted for digital information may be used for index data to be used in searching. Seven alphanumeric characters of six bits each can be designated in a single column.

To record the digital information on the film, the code is first punched into a paper tape, or it may be entered from a keyboard at the camera. The camera exposes the paper tape code pattern automatically. After all the code has been exposed, the documents are exposed under control of an operator, who positions the documents. The film is processed in roll form, then cut into individual minicards and stacked on the minicard sticks automatically. Two different mechanisms have been designed to sort minicards by the coded information.

Information is selected from the minicards through the automatic matching of coded labels in the question data to the proper minicard, or by logical relations. These cards are then directed into a receiving magazine. Question data are set up in the selector by means of a typewriter keyboard or a punched tape input, and by switches on a control panel.

The selected cards may then be viewed in either a personal viewer or a desk viewer.

The economy of size of a minicard file system is shown in these comparative figures: A file of 2,000,000 minicards, roughly equal to 1,000 file cabinets, will occupy a minicard cabinet about 15x30x50 inches. The work area and storage file of 10,000,000 minicards could be placed conveniently on a floor area 10' x 10'.

The Librascope General Purpose Digital Computer, LGP-30

Stanley Frankel, Librascope, Inc., Glendale, Calif.

Computer characteristics

This is a technical paper which describes the LGP-30 in detail. Here is a resume of some of its characteristics:

Number System	Binary
Word Length	9 decimal digits plus sign
Memory	Magnetic drum, 4096 words, plus 3 one-word working registers
Total Access time	2 ms min. – 17 ms max.
Addition time	.26 ms (excluding access time)
Multiplication or division time	17 ms (excluding access time)
Input–output	Paper tape or electric typewriter
Size	26" deep, 33" high, 44" long, exclusive of the typewriter
Weight	700 pounds
Power requirements	115 volts A.C. @ 13 amps, 60 cycle
Cooling requirements	Internal forced air blower. No external air conditioning required
Order structure	Add, Subtract, 2 multiply commands, Divide, Extract, Test sign, Transfer control, 2 record in main memory commands, Read from memory to accumulator, Type out or punch, Read from tape, Conditional halt, 2 record address commands
Cost	$29,800.00

Programming and service available.

"Systems mechanization--office paperwork"

P. B. Garrott and Robert A. Scudder, Standard Register Co.
OFFICE EXECUTIVE, January 1956; pages 15, 18.

Twelve pieces of equipment are described briefly which provide the facility of being operated by a tape or card, and thus can become parts of an integrated data processing system. These are: AT & T Model 19 Teletypewriter, Model 15 Receiving Only Teletypewriter, Model 14 Receiving Only Typing Reperforator; Commercial Controls Flexowriter; IBM or Remington Rand Tape-to-Card Converter; IBM Cardatype; Monroe Bookkeeping Machine to Tape;

Friden Add-Punch; Addressograph-Multigraph Automatic Graphotype; Western Union Model 19 Teleprinter, Model 15 Teleprinter, Model 14 Teleprinter Typing Reperforator. IDP helps eliminate errors (error rate was running at two-tenths of one percent at one installation), reduce paperwork time lag, and can be applied in almost any organization with a large volume of paperwork.

NCR Intercoupler

Manufactured by Systematics, Inc., Hermosa Beach, California

The new Model 31240 numeric NCR Intercoupler which links accounting machines with card or tape punch devices, has three features not included on the older models:

1. Automatic credit balance
2. Remington-Rand card punch connection
3. Alphabetic and tape adaptation for tying in with typewriter keyboard or paper tape punch.

"Kodak, Addressograph unveil new electronic data processing system"

WALL STREET JOURNAL, January 18, 1956.

A new data processing system designed especially for handling large volume mailing list operations is being produced by Eastman and installed by Addressograph.

"Push-button checks"

BUSINESS WEEK, January 7, 1955; page 60.

A new check-writing device which converts figures into words on checks by means of punched cards is in operation at Shell Petroleum Co., Ltd., London.

Programming

"The ELECOM 125 Compiler System"

Dr. Leon Nemerever, Underwood Corp.
ELECOM PULSE, Autumn 1955; pages 7-9. *

Automatic programming by Underwood

The article consists of excerpts from an address Dr. Nemerever presented at the 1955 National Meeting of the Association for Computing Machinery.

"The ELECOM 125 Compiler System is an integrated set of service routines, the heart of which is the ELECODER I...a general purpose compiler routine useful for scientific as well as commercial applications."

A program is compiled in the following manner:

"1. A list of the names of the subroutines which comprise the program for the application is punched on paper tape. A subroutine name is a four-digit number by which the compiler identifies a subroutine.

2. All subroutines pertinent to a particular application are assembled on a single magnetic tape, called a library tape.

3. Using the paper-tape list as compiling instructions and the magnetic library tape as input data, the ELECODER I compiles the desired program and records it on magnetic tape together with the necessary reading instructions. This program tape is then used as the running tape for the program and has no further relation to the compiler.

4. In addition to the program tape, the ELECODER I yields a Twin Edit in book form...a printed record which displays the coding of the compiled program in final form alongside the coding of each subroutine as it appears in original form....an aid to the programmer in the debugging of the finished program."

The article continues with a description of the principles of the system and examples of its use.

* A copy of the PULSE may be obtained from the Electronic Computer Division of Underwood Corp., 35-10 36th Ave., Long Island City, 6, N. Y.

Management Decision-making Techniques

"An engineer's approach to office systems"

Douglass A. Young, Meter Division, Westinghouse Electric Corp.
"Controlling office production, AMA Office Management Series #140.

Inventory levels adjust automatically to current needs

The author believes that business systems must be developed in the same fashion as mechanical or electrical devices: 1) Find out causes and reactions, 2) mechanize, 3) automatize. In addition, his advice is to use "terrifically high-speed office machines....to create decisions."

"One of the things we are doing with our machines is to control inventories, which...consist of about 25,000 items...

"...we make little effort to control this inventory to any particular level.... we make our machines adjust each inventory item to suit prevailing conditions, such as cost of money, shop load, customer buying patterns, and many other factors which should influence the exact level of inventory. However, the inventory items themselves are treated as dependent variables and allowed to adjust almost automatically, each to a level which will satisfy the interests of the division as a whole....The machines are constantly examining the characteristics of each item, taking into account such factors as rate of usage, trend of usage, replenishment time, unit cost, and frequency of demands."

Certain management decisions are incorporated in a stock control program for the electronic computer, so that the machine can determine automatically what should be stocked, the size of the individual orders, and the times at which the orders should be placed. "Each month the machines publish a list, *not of things on which decisions are yet to be made, but of things which are to be done*....The only manual review is one of checking to see whether or not an item is in the process of being obsoleted."

As a result of the above experience, the Division has developed a checklist for evaluating new developments which includes these points:

What does management need to accomplish with the program?

What kind of decisions must the program produce?

What economic factors must be used in making these decisions?

Will the program generate decisions instead of reports?

Does it see new facts and properly weigh them?

Does it forget out-of-date things, and, if possible, does it forget mistakes in feedback?

Is it dynamic in that it is continually reappraising and readjusting to meet current conditions?

Does it reasonably take deviations from normal into proper perspective?

Can the people who operate it be reasonably expected to do all that is required from them?

Does it recognize that, as the need for manual decisions is removed, less and less manual decisions result?

Does it adequately tie in with other, related programs?

Does it work to a permissible limit of error rather than strain to obtain perfection?

Does it do some things which are impractical by manual methods? (We are not particularly interested in merely converting manual operations to machine operations.)

Is this program necessary?

*See DPD this issue, page 14.

"Linear programming and computers"

Chandler Davis
COMPUTERS AND AUTOMATION, Part I, July 1955; pages 10-17. Part II, August 1955; pages 10-16.

This 2-part article is about as simple an explanation of the simplex method of solving linear programming problems as is possible, while still covering the important mathematical concepts. The reader should have some knowledge of algebra, and analytic geometry along with some mathematical intuition to benefit from the article.

"Computing experience with linear programming and its variants"

William Orchard-Hays, The RAND Corp., Santa Monica, Calif.
RAND Report #P-688

This paper discusses a number of simplex codes for the IBM 701, designed by RAND for use in linear programming.

General Information

"Training personnel in electronics for business applications"

Dr. Arvid Jacobson, Wayne University, Detroit
MANAGEMENT METHODS, December 1955; pages 11-15.

Liberal college education best for high level jobs

As the director of the Computation Laboratory at Wayne University, Dr. Jacobson has been active in defining the educational needs of personnel in business electronics applications. Although industry leans toward a preference for computer training by the colleges and universities, "training in this field must be based on scientific and liberal education, and...vocational and narrow technician's approach [should] be avoided."

"High schools can contribute a great deal to the solution of the [personnel] problem. In most cases, high school graduates can be easily trained to perform routine tasks....Also, vocational high schools can provide good preparation for maintenance work...."

On the college level, the emphasis should be on numerical analysis. Business colleges should be encouraged to introduce electronic data processing into their curriculum.

Average salaries for typical electronics jobs as of February 1955 are given: Program leaders, $12,000–15,000; Analyst-programmer, $8,000–10,000; Operating personnel, $6,000–7,000 (supervisor)--$4,500-6,000 (journeyman).

"How to train your own personnel"

James W. Smith, E. I. duPont Co.
MANAGEMENT METHODS, December 1955; page 11.

Train systems men who know the company well

Since the supply of qualified personnel for EDP is limited, the following suggestions are made for training company personnel:

"...systems men who have some punched card experience and who have a thorough knowledge of the company's operation are the best choice for training as electronic data processing specialists. It is best, if possible, to secure at least one individual who has a background of mathematics, engineering and previous computer experience to supplement an inexperienced staff.

"Select personnel from within the company and send them to a programmers' school. Immediately after completion of the school, put them to work on programming under the guidance of an experienced computer specialist preferably hired, but acceptably acquired on a temporary basis through a consulting firm or an equipment manufacturer. After six months to a year, most of these individuals selected for training will emerge as competent programmers."

"The Office: Its changing functions and structure" *(Office Management Series #139)*

"Controlling office production" *(Office Management Series #140)*

"Improving office reports, manuals, and records" *(Office Management Series #141)*

American Management Association publications

Aids for business analysis

The need for evaluating the usefulness of expensive electronic equipment before purchasing has helped focus attention on the organization of the business itself, and on the functions which are necessary for successful operation. The three booklets listed above present some interesting thoughts on these matters. Of particular interest are "An engineer's approach to office systems" in #140, abstracted in this issue on page 11, and "Strengthening and simplifying the structure of management reports" in #141. In this latter article, three steps are given for a program to increase the value of a company's reports as a management tool:

1. Isolate and build the report structure around the key elements of performance that determine short- and long-term profit results.

2. For each of these critical elements of performance, develop yardsticks for measuring the kind of a job that is done.

3. Present information in a form that is easy for the non-accounting executive to understand.

"Measuring the problems of today and tomorrow in electronics"

R. C. McCollum, Peoples Gas Light and Coke Company, Chicago
Paper presented to American Gas Association, October 1955.

Preplan the system for normal operations and predictions

Six booby traps are pointed out from the experience of the author in setting up an electronic data processing system:

1. Under-estimating the difficulties involved in converting to the new medium. There is the danger of having too little knowledge of procedures, and of being too late in building up a trained staff capable of handling the problem within the desired time limit.

2. Need for basic research in present system. Most manual areas involve one or more judgment operations. The factors that are unconsciously involved in making these decisions must be analyzed.

3. The error of designing a system around exceptions rather than around normal cases.

4. Inadequate analysis of exception cases. Each exception should be studied to make certain that a legitimate reason exists for the variation.

5. Avoiding the problem of duplication. If one area of the company is excluded from the electronics plans, allowing duplication of records to exist, the electronic system will sooner or later be subject to a major change aimed at eliminating such duplication.

6. Overlooking the operations control possibilities of the new equipment. The new system must be designed on the basis of preparing predictive reports rather than post-mortem reports.

"Production planning and control in office operations"

Management Bulletin, Bureau of the Budget, October 1949.

Much has been written about the need for analyzing the systems and procedures of a business as a preliminary step in the computer feasibility study. This bulletin contains some practical ideas in making such an analysis. It can be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price, 45 cents.

"Process charting"

Management Bulletin, Bureau of the Budget, November 1945.

Various types of charts are discussed, which help in the analysis of systems and procedures, as described in the bulletin listed above. This bulletin can be purchased from the same source as the one listed above. Price, 55 cents.

"Who's going to lose what job?"

Herbert O. Brayer
AMERICAN BUSINESS, December 1955; pages 24, 25, 32.

A survey of businesses now using automatic data processing techniques reveals "there is no threat to white collar jobs from either the new systems or new equipment!" Moreover, "converting the lower echelon of management [to automation in the office] remains our most difficult problem."

"Digital computers in Eastern Europe"

Alston S. Householder, Oak Ridge National Laboratory, Tenn.
COMPUTERS AND AUTOMATION, December 1955; pages 8, 9, 31.

Two Russian computers, the BESM and URAL, were among the papers presented at the Darmstadt Conference on Electronic Digital Computers and Information Processing, held in Germany in October, 1955. The BESM is a scientific computer, the URAL somewhat on the order of an IBM 650.

"Publications for business on automatic computers: a basic listing."

Ned Chapin, Illinois Institute of Technology
COMPUTERS AND AUTOMATION, September 1955; pages 13-16, 38.

A basic reading list for those with a business background is chosen from the author's own experience. The selections are annotated, and are listed under general headings such as Use of Computers in General, Feasibility Studies, Integrated Data Processing, Programming, etc.

A total of 58 references is given.

Comment

New training film available

A new training film on the electronic digital computer has been announced by the American Management Association, available on February 27, 1956. It consists of a series of four color film strips. Title of the series is "Using Computers in Business." The four parts are:

1. Data Processing and the Computer (15 min.)
2. The Computer System (22 min.)
3. The Feasibility Study (22 min.)
4. Business Electronics at Work (16 min.)

The strips are for purchase as a group, only.

Price to AMA members: $ 95.00

Price to non-members: $110.00

DPD will review these films in a subsequent issue.

Training, Seminars, Meetings

Third Annual High-Speed Computer Conference, February 14-17; New Orleans. For further information write: Dr. Leon Megginson, College of Commerce, Louisiana State University, Baton Rouge, Louisiana.

Electronic Conference and Exhibit, American Management Association; February 27-29, Hotel Commodore, New York. For further information, write AMA, 1515 Broadway, Times Square, New York 36, New York.

The joint meeting of the Operations Research Society of America and The Institute of Management Science will be held March 30, 31 at the University of California at Los Angeles. For further information, write Engineering Extension, UCLA, Los Angeles 24.

"Design of Data Processing Systems, a five-day course offered by UCLA Extension, beginning April 16, 1956, in San Diego, California. Classes will be held from 9:00 AM to 4:00 PM each day at the U.S. Grant Hotel. Registration, $50.00, including all materials. For further information, write University Extension, University of California, 1015 Seventh Avenue, San Diego 1, California. BElmont 9-9221.

Southern California Business Show (N.A.C.A.) April 24-27; Ambassador Hotel, Los Angeles. For further information write: R. E. McRann, General Chairman, So. Calif. Business Show, 731 South Spring St., Los Angeles 14, California.

National meeting, The Institute of Management Science, on the campus of University of California at Los Angeles, October 1956 (no dates set).

N.M.A.A. Second Annual Electronics Business Systems Conference, Nov. 8, 9, 1956; San Francisco. Sponsored by the eleven Western N.M.A.A. Chapters.

Third International Automation Exposition, November 26-30, 1956; New York Trade Show Building.

References

American Management Association
1515 Broadway
Times Square
New York, New York

AUTOMATION
Penton Building
Cleveland 13, Ohio

Benson-Lehner Corporation
2340 Sawtelle Boulevard
Los Angeles 64, California

BUSINESS WEEK
330 West 42nd Street
New York 36, New York

COMPUTERS AND AUTOMATION
513 Avenue of the Americas
New York 11, New York

CONTROL ENGINEERING
330 West 42nd Street
New York 36, New York

Eastman Kodak Company
Rochester 4
New York

JOURNAL OF INDUSTRIAL ENGINEERING
225 North Avenue, N. W.
Atlanta, Georgia

JOURNAL of the Operations Research Society of America
7100 Connecticut Avenue
Chevy Chase 15, Maryland

Librascope, Incorporated
808 Western Avenue
Glendale, California

MANAGEMENT METHODS
141 East 44th Street
New York 17, New York

OFFICE EXECUTIVE
132 West Chelten Avenue
Philadelphia 44, Pennsylvania

OFFICE MANAGEMENT
212 Fifth Avenue
New York 10, New York

Peoples Gas Light & Coke Company
122 South Michigan Avenue
Chicago 3, Illinois

RAND Corporation
1700 Main Street
Santa Monica, California

Superintendent of Documents
U. S. Government Printing Office
Washington 25, D. C.

Systematics, Incorporated
30 Hermosa Avenue
Hermosa Beach, California

Underwood Corporation
35-10 36th Avenue
Long Island City 6, New York

WALL STREET JOURNAL
44 Broad Street
New York 4, New York

See DPD October, 1955, for list of seventy-six periodicals regularly reviewed for significant information in the data processing and related fields.

DATA PROCESSING DIGEST is published each month by Canning, Sisson and Associates, 914 South Robertson Boulevard, Los Angeles 35, California. Subscription rate: $24.00 per year. Foreign postage (exclusive of Canada and Mexico): $1.00 additional. Single copies: $3.00 when available. Editor: Margaret Milligan.